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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/563,316	03/24/2006	Sei Aoki	Q92362	8433
23373 7590 11/17/2008 SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037				
EXAMINER				
LACLAIR, DARCY D				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/563,316

**Applicant(s)**

AOKI ET AL.

**Examiner**

Darcy D. LaClair

**Art Unit**

1796

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SF/88)  
Paper No(s)/Mail Date \_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_

### **DETAILED ACTION**

1. All outstanding rejections, except for those maintained below are withdrawn in light of the amendment filed on 8/25/2008.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### ***Claim Objections***

2. **Claim 4** is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Specifically, **Claim 4** requires the composition comprise (2) soot and (3) residue, and **Claim 1** requires the fullerene composition containing at least one of (2) soot and (3) residue.

3. **Claim 1 and 9** are objected to because of the following informalities: The claims recite the fullerene-containing composition contains at least one of (2) soot and (3) residue. This would more appropriately recite at least one of (2) soot **or** (3) residue. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

4. **Claims 1-11** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to

one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, the original claims and specification supports 0.1 to 10 parts of fullerenes compounded with 100 parts of rubber. By amending "fullerenes" to "a fullerene-containing composition" the proportion of the fullerene has been changed in an unsupported manner. **Claims 1, 3-5, and 7-9** contain this term, and the remaining claims depend from **Claim 1 or 9**.

5. **Claims 1-11** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "fullerene-containing composition" in **claims 1, 3-5, and 7-9** is a relative term which renders the claim indefinite. The term "fullerene-containing composition" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Applicant appears to be using this term as an umbrella to refer to any of purified fullerenes, an unpurified soot containing fullerenes, or the residue remaining after the removal of the fullerenes from the soot. The residue may or may not contain fullerenes, depending on the purification protocol. The content of fullerenes in this component of the rubber composition is unclear, and applicant has not specified a degree of purity for the fullerenes. Based on I(D)/I(G) ratio given in the specification, it appears that the fullerene component is poorly purified. (see p. 8 line 10) Further, the term "composition"

generally suggests the intentional combination of parts into a whole, which is inconsistent with a fullerene containing product produced by combustion.

***Claim Rejections - 35 USC § 103***

6. **Claims 1-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Lukich et al. (US 5,750,615)** in view of **Howard et al. (US 5,273,729)**

The examiner notes that **Claims 1 and 9** from which the remaining claims depend, are recited in product-by-process format, which does not carry patentable weight absent a showing to the contrary.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

Nevertheless, the prior art applied here [**Howard**] does disclose the claimed process.

**With regard to Claim 1**, which now requires a fullerene-containing composition, wherein the composition contains at least one of soot including fullerenes and residue generated by extraction of fullerenes from soot, Lukich teaches a curable rubber composition containing a fullerene form of carbon which is used as a reinforcing agent. (see abstract) The rubber composition, based on 100 parts by weight of rubber, contains 30 to about 100 phr of reinforcing particulate, which is composed of about 5 to about 100 weight percent of at least one fullerene carbon. (see col 2 line 35-45) This outlines a minimum of 1.5 phr and a maximum of 100 phr of fullerene carbon, which completely encompasses applicant's claimed range. Lukich specifically exemplifies a

composition with fullerene carbon soot after the removal of fullerenes (corresponding to applicant's (3) residue generated by extraction of fullerenes from the soot), and a composition with fullerenes extracted from the soot (corresponding to applicants (1) fullerene having a closed basket structure represented by  $C_{2n}$ ). (See Table 2) Lukich teaches that fullerenes may typically be produced by laser evaporation of graphite ("arc method") (see col 5 line 41) but may be synthesized by methods known in the art or purchased commercially. (see col 5 line 60-61) Lukich fails to teach the combustion method for producing fullerenes. Howard teaches a "combustion method for producing fullerenes" (see title) Howard teaches that the condensibles of the flame contain fullerenes (see col 1 line 67), and that the condensibles can be collected alone or with soot. (see col 2 line 6-7) Howard teaches that a much larger yield of C70 and the ability to control the C70/C60 ratio by setting the flame conditions differentiate combustion synthesis from the vaporization technique. (see col 7 line 31-34) Based on the additional flexibility of the process in generating desired, it would be obvious for Lukich to obtain the fullerenes, fullerene soot, or residue by the combustion method. In addition, the combustion method is a more inexpensive alternative to the combustion method. It would be obvious to select a more inexpensive material or process, especially where it offers equivalent or improved results.

**With regard to Claim 2**, Lukich teaches 30 to about 100 phr of reinforcing particulate which is 0 to 95% by weight of carbon black. (col 2 line 37-43) This provides a range of 0 to 95 phr of carbon black, which encompasses applicant's claimed range.

**With regard to Claims 3 and 4**, Lukich exemplifies a composition containing fullerene carbon soot after the removal of fullerenes (corresponding to applicant's (3) residue generated by extraction of fullerenes from the soot). (see Table 2) Additionally, Howard teaches that the product of the combustion method may be collected as fullerenes alone, or as a combination of fullerenes and soot. This combination, collected for use, corresponds to applicant's (2) soot including fullerenes. (see col 2 line 6-7)

**With regard to Claim 5**, Lukich teaches a range 1.5 phr and a maximum of 100 phr of fullerene carbon. (see discussion, above, with regard to **Claim 1**)

**With regard to Claim 6**, Lukich teaches an alternative embodiment which additionally contains silica and a silica coupling agent (corresponding to applicant's silane or  $\text{SiH}_4$  coupling agent.) (see col 8 line 48-54)

**With regard to Claim 7**, Lukich teaches about 30 to about 100 phr, or alternately about 35 to about 90 phr, of reinforcing particulate, which can be at least one fullerene carbon, at least one carbon black and precipitated silica. (see col 2 line 35-45) This substantially overlaps with applicant's claimed range.

**With regard to Claim 8**, Lukich teaches that the fullerene carbon should be about 5 to about 100 weight percent of the particulate elastomer reinforcement. This substantially encompasses applicant's claimed range.

**With regard to Claim 9**, Lukich teaches a tire having a tread composed of a rubber composition containing, as a reinforcement, a fullerene form of carbon. (see col

2 line 12-18) With regard to the composition and the fullerenes, see the discussion above, with regard to **Claim 1**.

**With regard to Claim 10**, Lukich teaches the tread is composed of the rubber composition. (see col 2 line 12)

**Claim 11** (new) requires the residue has an X-ray diffraction peak within the range of 10-18 degrees and no peak in the range of 26-27 degrees. Howard teaches a method with a variety of fullerene yields and compositions determined by selectively controlling flame conditions and parameters such as C/O ratio, pressure, temperature, residence time, diluent concentration, and gas velocity. (see abstract) Howard used premixed laminar flames of benzene and oxygen with argon diluent stabilized on a water-cooled burner in a low-pressure chamber and exhausted into a vacuum pump. (see col 3 line 29-33) Howard prepared examples (3a/3b) which utilized a C/O ratio of .995, a pressure of 20 mm Hg, a cold gas velocity of 49.1 cm/s, and 10 mol % of argon. (see Table 1) This is consistent with applicant's exemplified fullerenes, which were produced in "an apparatus in which a premixing-type water cooled burner is installed in a reduced pressure chamber, [...]" and the raw material (benzene) and oxygen were premixed and fed to the burner [...]" and "combustion proceeded under the conditions of a C/O ratio of 0.995, a combustion chamber pressure of 20 torr, a gas flow rate of 49 cm/s, and a diluted argon concentration of 10 mol percent." (see p. 13 line 24 - 30) The examiner notes that 1 torr is equal to 1 mm Hg. These are identical starting materials and process conditions, meaning that identical soot would be generated. Both Howard (see col 3 line 67) and Lukich (see col 10 line 59-61) detail a solvent extraction used to



separate the fullerene portion from the residue portion. If the fullerenes were so removed, the remaining residue, deriving from identically generated soot, would have identical X-ray diffraction properties. Although applicant has indicated at p. 8 line 3 that the residue has "a special structure that has conventionally been utterly unknown as a carbon material," no factual evidence has been provided to support such a strong assertion. In fact an identical fullerene containing soot, which would contain the same residue portion, has been generated by Howard.

#### ***Response to Arguments***

7. Applicant's arguments filed **8/25/08** have been fully considered. Specifically, applicant argues (A) the grounds for rejections under **35 USC § 112** have been remedied by clarifying amendments indicating that the rubber composition contains 0.1 to 10 parts by mass of "a fullerene-containing composition" rather than "fullerenes." (B) Luckich et al., or any combination of Luckich and Curl, fails to anticipate the claims because the non-fullerene portion of the soot or residue would have important structural changes based on the production method, as indicated in the specification at page 7, line 25 to page 8 line 21.

**With respect to argument (A)**, applicant's remarks have been considered. The rejections are ***withdrawn in light of applicant's amendments***.

**With respect to argument (B)**, applicant's remarks have been considered but are ***moot in view of the new ground(s) of rejection***.

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Darcy D. LaClair whose telephone number is (571)270-5462. The examiner can normally be reached on Monday-Thursday 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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